

Teaching techniques in high schools by combining STEM and watershed science

AT A GLANCE

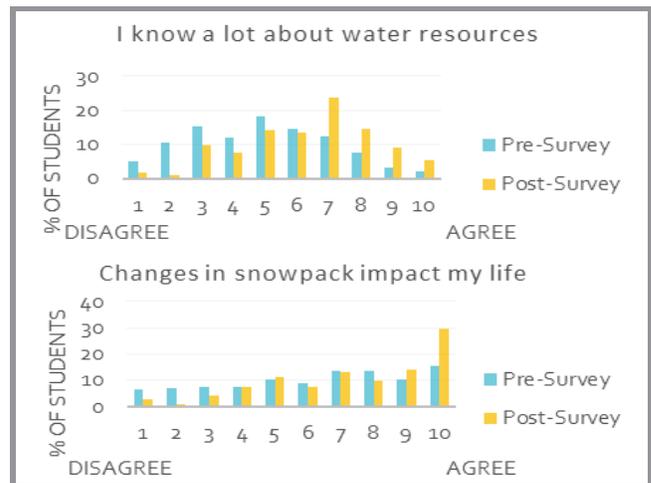
Transformative high school program teaches STEM skills and watershed science using place-based, investigative teaching techniques.

The Situation

It is vital for its student population to be equipped in the 21st century skills and knowledge required to pursue viable careers in STEM (Science, Technology, Engineering and Math) fields that are growing in Idaho and nationwide. Currently these industries cannot employ a substantial portion of the state workforce due to a lack of adequate expertise or training in these fields. In addition to the broad-based STEM skills, Idaho's future workforce is dependent on sustainable supplies of clean water to agriculture, industry and municipalities. The Confluence Project is an education program at the intersection of STEM education and watershed science, preparing Idaho high school students with skills to increase the go-on rate (that is, students continuing education beyond high school by earning a post-high school certificate or graduating from a local community college or state university).

Our Response

University of Idaho Extension Water Outreach partnered with the U of I College of Education, Health and Human Sciences Water Resources program, Coeur d'Alene Tribe, Idaho Department of Environmental Quality and Kootenai Environmental Alliance to develop and deliver place-based, investigative watershed



Pre- and post-surveys indicate a strong increase in science self-efficacy in The Confluence Project high school participants.

science teaching techniques and a high school program designed for providing students with the 21st century science skills needed for success in Idaho's workforce future. In addition, a third or more of Idaho's surface waters (streams and lakes) are impacted by some pollution. Students will need to find innovative ways to provide and protect the ample clean water required for Idaho agriculture, industry and municipalities into a growing future.

Program Outcomes

Since 2013, almost 2,000 Idaho high school students have demonstrated critical thinking and investigative skills by presenting research to experts and peers in a science conference setting. We provide professionals in the water science fields training on an extensive rubric

and judging training to ensure program assessment consistency. The Confluence Project (TCP) teachers incorporate judge scores into the students' final project grades. Judges also provide helpful feedback for the student groups they interact with during the judging process. In turn, the students see professionals in the field as "real people," increasing the likelihood of future job prospects. Students take a pre- and post-survey to determine changes in science knowledge and self-efficacy. Student responses demonstrate strong increases in science self-efficacy. In all categories, students demonstrated increased knowledge about water science, and increased confidence in their knowledge.

The TCP program has been developed into an approved four-day iSTEM Institute Strand, including classroom and field experiences, to provide high school teachers with highly adaptable curriculum and teaching tools for improving students' STEM knowledge and skills. In addition, we developed the program into a one-day teacher professional development workshop for those teachers who cannot attend a full iSTEM Institute. The Confluence Project Academy is an official U of I professional development course tailored to high school science teachers interested in teaching STEM subjects using investigative, place-based technique. Data from post-workshop surveys suggest that the high school science teachers are more prepared to teach field science, and receive the resources they need for effective experiential watershed science instruction.

The Future

Plans for The Confluence Project include expansion throughout schools within the Coeur d'Alene Lake basin and adjacent watersheds. Grant funding from the Kootenai Aquifer Protection District enabled TCP to add an aquifer education component to the program. Additional funding could reinstall an agricultural soils component, as well.

Cooperators and Co-Sponsors

The Confluence Project is administered in a reciprocal partnership with Idaho Department of Environmental Quality, Coeur d'Alene Tribe Lake Management, Kootenai Environmental Alliance, U of I College of Education, Health and Human Services Water Resources program and the Community Water Resource Center at University of Idaho Coeur d'Alene.

FOR MORE INFORMATION

Jim Ekins, Area Water Educator • University of Idaho Extension, Northern District • 208-292-1287 • jekins@uidaho.edu

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